NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech

SEM: II - THEORY EXAMINATION (2022-2023)

Subject: Digital Image Processing

Time: 3 Hours   **Max. Marks: 70**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

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SECTION A   **15**

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1. Attempt all parts:-

1-a.   How many number of steps are involved in image processing?(CO1)   1

            (a) 10

            (b) 11

            (c) 6

            (d) 8

1-b.   Smoothing filter is used to remove _____ from an image.(CO2)   1

            (a) Smooth transitions of brightness levels

            (b) Smooth transitions of grey levels

            (c) Sharp transitions of brightness levels

            (d) Sharp transitions of grey levels.

1-c.   The filtering is performed using DFT using   1

            1) Limited size or blocks of data

            2) Small memory size

            3) Large memory size

            4) Large segments of data

(CO3)

    (a) 1, 2 and 3 are correct

    (b) 3 and 4 are correct

    (c) 1 and 2 are correct

    (d) All of the mentioned

1-d.   If the inner region of the object is textured, then approach we use is(CO4)   1

    (a) discontinuity

    (b) similarity

    (c) extraction

    (d) recognition

1-e.   Color transformation is modeled using(CO5)   1

    (a) $g(x,y) = [f(x,y)]$

    (b) $g(x,y) = T[f(x)]$

    (c) $g(x,y) = T[f(y)]$

    (d) $g(x,y) = T[f(x,y)]$

2. Attempt all parts:-

2.a.   Find the number of bits required to store a 256x256 image of 32 gray levels (i.e. A 5-bit Image)(CO1)   2

2.b.   What is mean by image averaging?(CO2)   2

2.c.   What is wrap around error?(CO3)   2

2.d.   Define point detection.(CO4)   2

2.e.   What is run length coding?(CO5)   2

SECTION B   **20**

3. Answer any <u>five</u> of the following:-

3-a.   Explain the basic relationships between pixels.(CO1)   4

3-b.   Explain the concept of convolution and correlation.(CO1)   4

3-c.   What are image sharpening filters. Name the various types of it and also write the formula for that filter. (CO2)   4

3-d.   Specify the properties of 2D fourier transform.(CO2)   4

3.e.   Write Short note on Inverse Walsh Transform(CO3)   4

3.f.   Explain Boundary Segments.(CO4)   4

3.g.   Explain about Mach band effect?(CO5)   4

4. Answer any <u>one</u> of the following:-

4-a.   Write the history of digital image processing. (CO1)   7

4-b.   Explain the concept of spatial resolution with example. (CO1)   7

5. Answer any <u>one</u> of the following:-

5-a.   Explain Weiner smoothing filter and its relation with inverse filtering and diffracted limited systems. (CO2)   7

5-b.   Explain the concept of Sharpening of image. How sharpening impacts the image enhancement. (CO2)   7

6. Answer any <u>one</u> of the following:-

6-a.   Explain haar Transform with suitable equations.(CO3)   7

6-b.   Explain Inverse Hadamard Transform with suitable equations.(CO3)   7

7. Answer any <u>one</u> of the following:-

7-a.   Explain Morphological Image Processing using basic morphological algorithms.(CO4)   7

7-b.   Explain image degradation/restoration model.(CO4)   7

8. Answer any <u>one</u> of the following:-

8-a.   Define Compression and explain data Redundancy in image compression.(CO5)   7

8-b.   Explain the process of colour smoothing and sharpening.(CO5)   7